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THE ECONOMICS OF PRODUCTION AND MARKETING OF GREENHOUSE CROPS IN ALBERTA

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THE ECONOMICS OF PRODUCTION AND MARKETING OF GREENHOUSE CROPS IN ALBERTA

By

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Economic Services Division
Production Economics Branch
April, 1980

FOREWORD

Output from Alberta's flower and vegetable industry has not fully responded to the growing provincial demand for these products. Instead, the shortfall of fresh produce is being met by increasing imports from the U.S., Mexico and other provinces. Many Alberta growers and individuals interested in the horticultural sector recognize that Alberta has the potential to greatly expand flower and vegetable production. Given such favorable conditions, why has the provincial production of fresh produce not significantly increased?

To answer the latter question, growers have asked the Production Economics Branch of Alberta Agriculture to undertake a comprehensive economic evaluation of the flower and vegetable sector. In particular, the request was to examine the tax structure, production costs and returns, and any factors that seriously affect production of these commodities.

The report on greenhouse taxation in Alberta was published in March, 1979. A second report "Handling and Transportation of Flowers, Fruit and Vegetables in Alberta" was released in March, 1980.

This greenhouse report examines the level of investment and production costs/returns for Alberta greenhouses by region, size and crop. It also reports on problems related to production, transportation and other areas of concern as expressed by greenhouse operators. This study which covers the 1978 crop year will be repeated for the 1979 crop. A related study of production costs and returns for potatoes and field vegetables is also in process and should be completed in the fall of 1980.

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G. Nabi Chaudhary
&
Lloyd J. Andruchow

TABLE OF CONTENTS

Section | Page

Foreword ii
Acknowledgements iii
List of Tables vi
List of Figures vi

I INTRODUCTION 1
Objectives of the Study 2
The Study Sample 2
Method of Analysis 3

II GREENHOUSE OPERATIONS IN ALBERTA 5
Location and Size of Greenhouses 5
Physical Characteristics of Greenhouses 10
Greenhouse Crops 11
Greenhouse Production 12
Marketing of Greenhouse Produce 12

III GREENHOUSE PRODUCTION COSTS AND RETURNS 14
Computation of Individual Cost Components 14
Greenhouse Investment Costs 17
Greenhouse Operating Costs 20
Production Costs and Returns by Regions 21
Production Costs and Returns by Crops Produced 24
Production Costs and Returns by Size of Operation . . . 27
Comparison of Costs and Returns Between the Study Sample and Your Greenhouse 29

IV PRODUCTION PROBLEMS IN THE ALBERTA GREENHOUSE INDUSTRY . . 31

Section | Page

V TRANSPORTATION PROBLEMS IN THE ALBERTA GREENHOUSE INDUSTRY 34
  Air Service 34
  Bus Service 36
  Truck Service 37
  Railway Service 38

VI SUMMARY 40
  Summary of Costs and Returns 40
  Summary of Findings 42

LIST OF TABLES

Table Page

1 Total Greenhouse Area and Sales of Ornamental Flowers and Vegetables in Alberta, 1976-1978 7

2 Greenhouse Area by the Type of Structure for the Greehouses Surveyed, 1978 8

3 Average Investment and Investment Costs for the Greenhouses Surveyed, 1978 19

4 Average Greenhouse Operating Costs for the Greenhouses Surveyed, 1978 22

5 Comparison of Costs and Returns Between Group I, Group II, and the Study Sample 23

6 Comparison of Costs and Returns by Greenhouse Crops . . . 26

7 Comparison of Costs and Returns by Size of Operation . . 28

8 Comparison of Costs and Returns Between the Study Sample and Your Greenhouse 30

9 Summary of Greenhouse Production Costs and Returns, 1978 45

LIST OF FIGURES

Figure Page

1 Alberta Agriculture Regions 9

SECTION I

INTRODUCTION

Greenhouse flowers and vegetable production in Alberta has not kept pace with the growing provincial demand for these commodities. Production over the last few years has been erratic. Consequently, consumer dependence on imports has increased considerably.

Stagnation in the greenhouse industry has been related to high local production costs and increased flow of imports. These and other related factors lead many Alberta greenhouse producers to believe that improvement in the local industry will only occur if and when solutions are found for these basic problems.

Given the expressed concerns of the industry, the Alberta Agriculture Coordinating Committee requested in the spring of 1978, that the Production Economics Branch undertake a study of factors affecting the production of greenhouse crops in Alberta. This request was based on the recommendation of the Protected Crops Advisory Committee, membership of which includes greenhouse operators and researchers in horticulture. This committee requested two separate studies. One study was to deal with the taxation regulations for the greenhouse industry; the second study was to examine production costs and returns, and the factors affecting the production of greenhouse crops in Alberta.

The taxation report entitled, "Greenhouse Tax Structure in Alberta" was completed and published in March, 1979. The report on taxation regulations and their impact on the greenhouse industry in Alberta compared and contrasted the greenhouse tax structure in rural and urban areas of Alberta, and also Alberta versus other provinces.

This second report provides information on production costs and returns for different sizes of greenhouse operations in various regions of the Province. It also highlights the problems in the areas of production, marketing, transportation, availability of finance, and other concerns of the greenhouse operators in the Province.

Objectives of the Study

The following were the major objectives of the study:

1. Determination of the structure of the greenhouse industry in Alberta;
2. Estimation of costs and returns to Alberta producers;
3. Identification of the main factors influencing production and marketing of greenhouse crops in Alberta; and
4. Identification of the major problems experienced by greenhouse producers in Alberta.

The greenhouse study was the first phase of a comprehensive review of the vegetable and floral industry. Examination of field vegetables for fresh and processed markets is underway and is expected to be completed by fall, 1980.

The Study Sample

Keeping in view the study objectives, a detailed questionnaire was prepared to obtain the desired information from a systematic randomly selected sample of greenhouse operators across the province. It was envisaged that due to the uniqueness of each operation there might be some problems in selecting the sample. However, efforts were made to reduce this problem by selecting participants who appeared to be typical of particular size classes in the industry.

Forty-one (41) greenhouse operators were selected from a list provided by the Extension Horticulturist at Brooks.

After the selection, each operator was contacted personally to explain the purpose of the study and the contents of the questionnaire. It was decided to study the 1978 production year to obtain more current and accurate information on the greenhouse operation.

The study participants were again visited in early 1978 to complete the questionnaire that was delivered to them in the fall of 1978. Out of the forty-one (41) randomly selected study participants, only thirty-three (33) were able to provide complete records of their business. Seven (7) greenhouse operators were either unable to maintain reliable records or did not want to participate in the study. One study participant sold his business in 1978 for personal and/or health reasons. Therefore, in this report, data from thirty-three (33) greenhouse operators were used to meet the objectives of this study.

Method of Analysis

The analytic technique used to analyze the data received was "SPSS" (Statistical Package for the Social Sciences). The "SPSS" is an integrated system of computer programs for the analysis of social science data. It provides the user with a comprehensive set of procedures for data transformation and file manipulation, and it offers the researcher a large number of statistical routines commonly used in the social sciences.[1/]

After obtaining the completed questionnaires from the study participants (greenhouse operators), all of the data were transferred to computer input sheets. The input sheets were designed to accomodate all of the information recorded on the questionnaire.

[1/] Norman H., Nie, Dale H. Bent and C. Hadlai Hull, Statistical Package for the Social Studies, McGraw-Hill Book Company, New York, April 1971, pp. 1-3.

Each greenhouse operation was analyzed separately and the study participant received a detailed personalized report of his greenhouse operation. Later the entire sample was divided into two groups in order to preserve confidentiality of individual greenhouse enterprises, and to obtain representative costs and return estimates for northern and southern areas of the Province.

SECTION II

GREENHOUSE OPERATIONS IN ALBERTA

Location and Size of Greenhouses

Although greenhouses in Alberta are scattered throughout the Province, more than two-thirds of these operations are located in the south and south-central regions. Most of the greenhouses are located in towns and cities because of easy access to labour, marketing facilities, utilities and services necessary for the greenhouse operation. A few are located on farms where, because they are part of the farm business, they are relatively smaller in size when compared to greenhouses situated in towns and cities.

The exact number of commercial greenhouses in Alberta is not available as no survey has been undertaken to identify the location and number of greenhouses in the Province. A list of commercial greenhouses compiled by the Extension Horticulturist at the Horticultural Research Centre at Brooks in 1978, indicated that there were about eighty-five (85) commercial greenhouses in operation in the province. When the field survey for this study was being undertaken it was found that about 8 to 10 commercial greenhouses were not included in the above list. The fact that every year a few greenhouses go out of business while some enter the industry, further add to the difficulty of determining the precise number of greenhouses in the province.

Statistics Canada undertakes a survey of the greenhouse industry every year to identify the number of commercial operations, crops grown and the total output of crops produced in a controlled environment. In 1976, all known greenhouse operators in Alberta were contacted by Statistics Canada and only sixty-three (63) firms reported on their operations. In 1978, seventy-one (71) firms reported on their greenhouse operations. From these surveys, it was estimated that greenhouse area under glass and plastic was over 1.8 million square feet in 1976 and remained more or less the same in 1978.

Average area per firm both under glass and plastic declined from 29,419 square feet in the 1976 Statistics Canada survey to 25,873 square feet in 1978. Gross sales however, increased to $10 million in 1978 from $6.2 million in 1976, a 61 percent increase over three years. Average sales per firm also increased by 43 per cent in 1978 over the sales in 1976. Details regarding total area under glass and plastic, and total sales of vegetables, bedding plants and ornamental flowers in Alberta for years 1976 to 1978 are presented in Table 1.[1/]

The sizes of the greenhouses surveyed for this 1978 Alberta Agriculture study ranged from 1,520 square feet to 135,660 square feet. Distribution of the greenhouse area under glass, fiberglass and plastic is presented in Table 2. Group I represents north and north central Alberta (Regions 3-6); Group II represents south and south central Alberta (Regions 1 and 2).

Figure 1 shows the regional distribution of greenhouses in Group I and Group II. In Group I, total area under glass was 84,150 square feet, about 19 percent of the total greenhouse area surveyed in the north and north central regions. The greenhouse areas under fiberglass (67%) and plastic (14%), amounted 300,010 and 64,908 square feet, respectively.

In Group II, the distribution of the greenhouse area for the 21 study participants was quite different from that in

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[1/] Statistics Canada, Greenhouse Industry, Cat. No. 22-202, Annual, 1976-1978.

TABLE 1 TOTAL GREENHOUSE AREA AND SALES OF ORNAMENTAL FLOWERS AND VEGETABLES IN ALBERTA, 1976-1978

Area of Glass and Plastic	1976 Alberta	1977 Alberta	1978 Alberta
1. Number Reporting	63	79	71
Total Area Sq Ft.	1,853,372	1,793,529	1,837,121
Sq M	166,803	161,417	525,683
Av/Firm Sq Ft	29,419	22,703	25,875
Sq M	2,648	2,043	2,329
A. Glass			
Number Reporting	42	51	48
Area - Sq Ft	1,360,848	1,286,683	1,319,231
Area - Sq M	122,476	115,801	118,731
Av/Firm Sq Ft	32,401	25,229	28,679
Sq M	2,916	2,271	2,581
B. Plastic			
Number Reporting	39	51	44
Area - Sq Ft	492,524	506,846	517,890
Sq M	44,327	45,616	46,610
Av/Firm Sq Ft	12,629	9,938	11,770
Sq M	1,137	894	1,059
C. Sales			
Number Reporting	63	79	71
Total Sales "$"	6,242,478	9,044,290	10,038,976
Av/Firm $	99,087	114,485	141,394
Sales/Sq Ft of glass & plastic $	3.37	5.04	5.46
Sale/Sq M. of glass & plastic $	37,42	56.03	60.72

SOURCE: Statistics Canada, Greenhouse Industry, Cat. No. 22-202, Annual, 1976-1978.

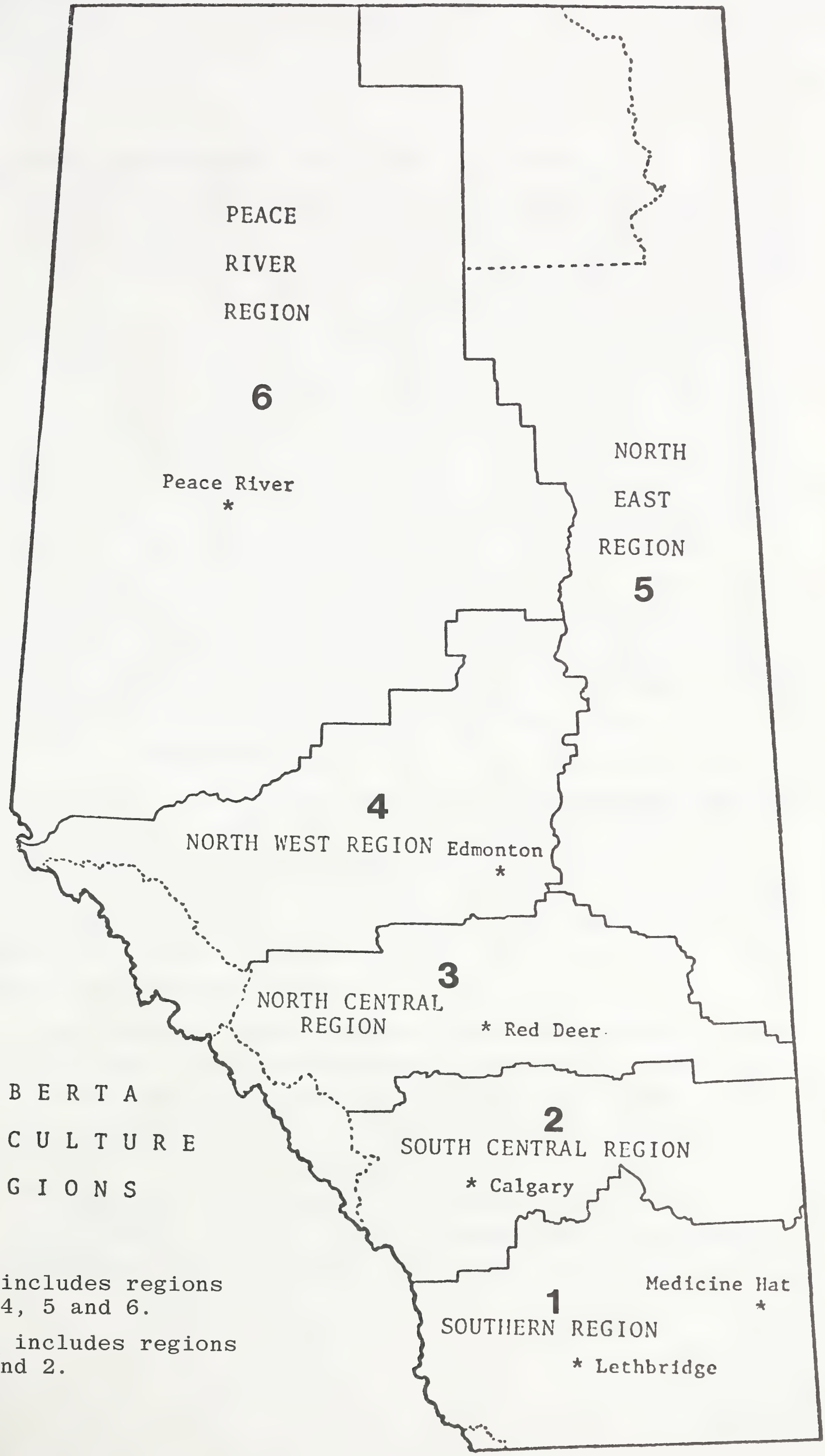
TABLE 2

GREENHOUSE AREA BY THE TYPE OF STRUCTURE FOR THE GREENHOUSES SURVEYED - 1978

	No. Of Greenhouses Surveyed	Greenhouse Area - - Square Feet				
		Glass	Fiber Glass	Plastic	Total	Average Per Grower
Group I[1]	12	84,150	300,010	64,908	449,068	37,422
Group II[2]	21	478,640	76,660	120	555,420	26,449
TOTAL	33	562,790	376,670	65,028	1,004,448	30,439

[1] Group I represents north and north central regions (3, 4, 5 and 6).

[2] Group II represents south and south central regions (1 and 2).



ALBERTA
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REGIONS

Group I includes regions 3, 4, 5 and 6.

Group II includes regions 1 and 2.

Group I. Over 86% of the total area reported was under glass compared to 14% for fiberglass. Area under plastic was negligible. Operators in Group II reported 478,640 square feet under glass, and 76,660 and 120 square feet under fiberglass and plastic, respectively.

Total area of the greenhouses surveyed for the year 1978 was 1,004,448 square feet, of which 562,790 square feet (56%) was under glass, 376,670 square feet (37.5%) under fiberglass, and 65,028 square feet (6.5%) under plastic. Average area per grower for Group I study participants was 37,422 square feet compared to 26,449 square feet for Group II. The average for the entire study sample was 30,439 square feet. It is interesting to note that over 86 percent of the glass structures was in the south and south central regions, Group II, with 14 percent in the north and north central regions, Group I. On the other hand, 80 percent of the total fibre-glass and over 44 percent of the total plastic structures were in the northern regions.

Physical Characteristics of Greenhouses

There are many types of greenhouses in Alberta ranging from the small shed roof "lean-to" houses constructed of wood-frame sash to the large modern steelframe houses with truss supported roofs. Most new houses are of steel, wood or masonary construction covered either with glass, fibreglass, single plastic, or a double layer of plastic. A 1978 survey carried out by Statistics Canada, reported that seventy-one (71) commercial greenhouses in Alberta have 1.3 million square-feet (72%) of glass and fibre-glass, and 517,890 square-feet (28%) of plastic.

Major internal-features of greenhouses systems in Alberta are as follows:

i) Temperature Control

A year round greenhouse operation is heated with natural gas to maintain optimum temperatures for crops grown during winter months. Some vegetable producing greenhouses operate for 9 to 10 months of the year and close down during November and December of each year. Almost all of the greenhouses in southern Alberta are heated by natural gas burners and, when combined with stove pipes, these burners provide sufficient heating through natural air movement. Greenhouses in northern Alberta are equipped with natural gas boilers and hot water pipes for heating purposes. All boiler heating systems have automatic temperature control devices.

In addition to heating systems, most greenhouses in Alberta are equipped with a cooling system called pad and fan. The cooling system is essential if temperatures are to be lowered during the hot summer months.

ii) Watering System

The watering of ground beds is usually accomplished by the use of soaker hoses which run on each side parallel to the bed. Bench beds and potted plants are usually watered with the use of chapin tubes. Smaller operations may utilize water supply pipes along with garden hoses.

iii) Supplementary Lighting

Very few greenhouses have supplementary lighting which are in the form of ordinary lamps, usually five to six feet apart. Supplementary lighting is mostly used for producing chrysanthemums.

Greenhouse Crops

Greenhouses in Alberta produce many kinds of flowers, chrysanthemums and roses being the most common potted plants.

Other potted plants include geraniums and potted mums. Outdoor flowers such as petunias and marigolds are also produced in these greenhouses. Some greenhouse operations concentrate on importing tropical plants which are then acclimatized to Alberta conditions before they are sold. The most commonly grown greenhouse vegetables are cucumbers and tomatoes.

Greenhouses surveyed for this study could be divided into three groups on the basis of major crops grown. Eighteen greenhouses (55%) were producing mainly flowers with some bedding plants, potted plants and vegetables. Thirteen greenhouses (39%) were producing only vegetables, the major crop being cucumbers; other crops included cabbage, peppers and tomatoes. Two greenhouses (6.6%) operated only during the bedding plant season February through May. Greenhouses producing flowers were in operation year round whereas the vegetable greenhouses were in operation for about 10 months, February through November.

Greenhouse Production

The only data available to indicate greenhouse production in Alberta are the gross sales which were $6.2 million in 1976, $9 million in 1977 and $10 million in 1978. It can be stated that although total area under glass and plastic had decreased by about 16,250 square feet in 1978 from 1976, overall greenhouse production measured as gross sales increased by 61 percent over 1976. The rapid increase in gross sales may be attributed mainly to higher prices received for produce sold.

Marketing of Greenhouse Produce

Greenhouse operators surveyed for this study used several marketing channels to sell their produce. Eighteen percent (6) of the greenhouse operators studied have their own retailing facilities. The retail factilities which are attached to the greenhouse or in shopping centres, handle 70 to 80 percent of the produce marketed. The remaining produce is shipped to wholesalers and retailers.

Forty-three percent (14) of greenhouses studied produced a combination of crops. These growers market 15 to 20 percent of their flower crops and vegetables at the gate. Nearly 60 to 70 percent is sold to wholesalers, with the remainder going to retail stores. Most of the bedding plants and potted plants are sold at the gate.

Thirty-nine percent (13) of the greenhouses surveyed produced only vegetables. Over three quarters (77%) of these greenhouses are located in southern Alberta, in and around the Medicine Hat area. Practically all of these operators market their produce through the Red-Hat Co-op at Redcliff. These operators pay a commission or fee set by the "Board of Directors" of the Co-op.[1/] The fees cover grading, packaging, storage, distribution and administration costs of the produce received at the Co-op.

The greenhouse vegetable and bedding plant producers in north central Alberta market 30 to 40 percent of their produce at the gate and 60 to 70 percent through rented stalls and booths in shopping centres.

[1/] Red Hat Co-op is a producer organization responsible for marketing vegetables grown in the greenhouses.

SECTION III

GREENHOUSE PRODUCTION COSTS AND RETURNS

Computation of Individual Cost Components

i) Interest on Investment

Interest is defined as a sum paid or calculated for the use of capital. The sum is usually expressed in terms of a rate or percentage of the capital involved, called the interest rate.

Interest rate is charged for the use of capital invested. Had the capital not been invested to buy a specific asset, it could have been utilized elsewhere either within or outside the firm, and would have brought some additional return to the firm.

A flat rate of 10 percent was used for the purposes of this study to determine a fair return to land investment. Building and equipment interest rate was also calculated at 10 percent. Interest applied on operating capital was 13 percent.

ii) Depreciation

Depreciation is defined as the loss in value over time due mainly to obsolescence. In the case of buildings and equipment, it is that portion of the decrease in value due to ownership and the passage of time. Obviously, part of the reduced value of the buildings and equipment is the result of usage and is considered a variable cost. The entire depreciation has been considered a fixed cost.

In computing depreciation, a 10 percent allowance or salvage value was taken from the purchase price of the buildings and equipment. The following formula was used in arriving at depreciation for buildings and equipment:

$$\text{Depreciation} = \frac{\text{Purchase Price - 10\% (Salvage Value)}}{\text{No. of Years of Life}}$$

iii) Land Value

Land associated with the greenhouse operation was valued at $1,500 per acre irrespective of its location. This value was determined through real estate values for a good farmland suitable for a greenhouse operation. It can be argued that allocation of land value distorts the land values in and around urban areas relative to farmland. However, for uniformity and reasonable cost estimates, it was decided to standardize the land value regardless of its location. Researchers are aware that land values in cities or towns are much higher than $1,500 per acre but if market values are used for land acquired five or ten years ago, it would lead to enormously high fixed costs which would greatly inflate overall production costs.

Most of the greenhouse operators surveyed have been in the greenhouse business for quite sometime with the exception of two who got into the business three to four years ago. It should also be noted that the uniform land value was used to compute the average land value investment for all of the study participants.

iv) Property and Business Taxes

Taxes on real estate included those paid on assessment of the greenhouse operations less any assessment for the greenhouse operator's residence or non-greenhouse operation. There is a business tax for greenhouses located in urban municipalities. The exact amount of the business tax was included in the costs.

v) Labour Costs

Hired labour costs included the actual amount of wages paid and any benefits received by the hired workers such as contributions to Workers' Compensation, Canada Pension Plan, Unemployment Insurance and any other costs.

The hours spent by the operator and his family in greenhouse production were estimated. An operator's labour was valued at $5.00 per hour and family labour was valued at a rate equal to that paid to hired labour or the actual amount paid to family labour.

vi) Production Materials and Supplies

Production materials and supplies included purchase of cuttings, seed, plants, fertilizers, chemicals, soils, vermiculite, perlite, peat moss, straw, peat pots and plastic. Costs for production materials and supplies were the actual figures provided by the study participants.

vii) Heating Costs

Almost all the greenhouse operators had reasonably accurate costs for heating the greenhouses with natural gas. Good record of monthly bills was helpful in arriving at the total heating costs.

viii) Utility costs

Utility costs included electricity, telephone and water. Where the utility bill was combined with the greenhouse operator's residence, the operator was asked to apportion the bill to arrive at total utility costs for the greenhouse operation.

ix) Transportation Expenses

Expenses for trucks or any other vehicles owned by the greenhouse operators were apportioned according to use in greenhouse operations, and personal and/or leisure driving. Freight charges paid to commercial or private carriers for hauling greenhouse produce or supplies were included in the transportation expenses.

x) Maintenance Costs

Maintenance costs included repairs to greenhouse structures, boilers, heating equipment, tractors, and all other machinery and equipment associated with the greenhouse operation.

xi) Miscellaneous Costs

These costs included legal and accounting fees, office supplies, bad debts, donations and membership fees, insurance costs and any other cost item incurred in a greenhouse operation.

xii) Marketing Charges

Marketing charges were the actual amount paid by each greenhouse operator for having his produce marketed through the Co-op at Redcliff. These charges covered grading, packaging, and commission fees. The charges paid by each grower were included as a cost item in the study.

Operators who marketed their produce through other marketing channels, provided estimates of their marketing costs which were included as such.

Greenhouse Investment Costs

Greenhouse investment costs for 1978 were obtained directly from the study participants during the survey. Each operator was asked to value his greenhouse structure based on the current market costs or on replacement value. Greenhouse operators were also asked to provide an estimate on the life of the structure in order to work-out interest and depreciation costs. During the analysis of the data, it was realized that some operators gave higher estimates for their structures and in these instances available market rate for constructing greenhouses was used and reasonable life figures were assumed to compute investment costs.

Investment costs were calculated on land, buildings, machinery, automotives and other miscellaneous equipment. Details on average investment and investment costs for the greenhouses in Group I, Group II and the study sample are given in Table 3.

i) Land Investment

Average land area associated with the greenhouses such as buildings (production area and office) and parking space, was 2.82 acres for Group I participants, 1.65 acres for Group II participants, and 2.08 acres for the study sample. Average land investment per greenhouse in Group I, Group II and the study sample was $4207, $2454, and $3091, respectively. Land investment cost (land interest) for each greenhouse averaged 1.1¢, 0.9¢ and 1.0¢ per square foot for Group I, Group II and the study sample, respectively (Table 3).

ii) Building Investment

Average building investment based on the replacement value in 1978 was $126,762 per greenhouse operation in Group I, $72,588 for Group II greenhouses, and $92,288 for the study sample. Average investment costs comprising of interest and depreciation on buildings were $19,627, $10,821 and $14,023 per greenhouse for greenhouses in Group I, Group II and the study sample, respectively. The corresponding investment costs per square foot of greenhouse were 52.4¢, 40.9¢ and 46.1¢, respectively (Table 3).

iii) Machinery Interest

Average machinery investment based on the purchase value of the equipment was $59,044 per greenhouse for Group I,

TABLE 3

AVERAGE INVESTMENT AND INVESTMENT COSTS FOR THE GREENHOUSES SURVEYED, 1978

	Group I	Group II	Study Sample
Number Surveyed	12	21	33
Land Area (acres)	2.82	1.65	2.08
Land Value ($)	4207.08	2454.05	3091.52
Land Interest	420.70	245.40	309.15
Land Interest Per Sq. Ft. ($)	0.011	0.009	0.01
Buildings (Sq. Ft.)	37422	26449	30439
Building Investment ($)	126762.00	72588.00	92288.00
Building Interest ($)	12676.24	7258.80	9228.78
Building Depreciation ($)	6950.95	3562.54	4794.69
Building Interest & Depreciation Per Sq. Ft. ($)	0.524	0.409	0.461
Machinery Investment ($)	59004.00	28160.00	39376.00
Machinery Interest ($)	3245.24	1548.78	2165.68
Machinery Depreciation ($)	3643.68	1261.22	2127.57
Machinery Interest & Depreciation Per Sq. Ft. ($)	0.184	0.106	0.141
Automotive Investment ($)	11792.00	10446.00	10935.00
Automotive Interest ($)	1179.25	1044.57	1093.54
Automotive Depreciation ($)	1061.32	1072.14	1068.21
Automotive Interest & Depreciation Per Sq. Ft. ($)	0.06	0.08	0.071
AVERAGE INVESTMENT PER GREENHOUSE ($)	201765.00	113648.00	145690.00
AVERAGE INVESTMENT COSTS ($)	29177.38	15993.45	20787.62
INVESTMENT COSTS PER SQ. FT. ($)	0.78	0.60	0.68

$28,160 for Group II, and $39,376 for the study sample. Average investment costs for machinery and equipment were 18.4¢ per square foot of greenhouse area for Group I, 10.6¢ per square foot for Group II, and 14.1¢ per square foot for the study sample. Details on investment costs on machinery and equipment are provided in Table 3.

iv) Automobile Investment

Average investment on automobiles was $11,792 per greenhouse for the study participants in Group I, $10,442 for Group II greenhouse operations, and $10,935 for the study sample. Average investment costs per average greenhouse for the three groups are given in Table 3.

Total investment costs ranged from $201,765 per greenhouse for Group I to $113,648 for Group II. The average investment for the sample as a whole was $145,690 per greenhouse. It is recalled that greenhouses in the north/north central regions averaged 41 percent more capacity than their Southern counterparts. Investment costs averaged 78¢, 60¢ and 68¢ per square foot for Group I, Group II and study sample, respectively.

Greenhouse Operating Costs

Greenhouse operating costs include all those costs which are incurred during the production of greenhouse crops. Some of the most common operating costs are hired labour, planting material, containers, greenhouse fuel, fertilizers, chemicals, repairs and maintenance, power, water, property taxes and purchase of supplies. All operating costs incurred in the greenhouses in 1978 are listed in Table 4. Out of all the operating costs items, hired labour costs were the highest for Group I greenhouse operators at $74,803 versus $15,471 for Group II, the average for the study sample was $38,036.

The second highest cost item was seed/cuttings which averaged about $21,600. Group I fuel costs at $17,186 was 3.4 times those of Group II in the south. Similarly Group I expenditures on containers of $121,160 were 3.5 times those of Group II.

Greenhouses in north/north central Alberta, Group I, reported average operating costs of $200,773 which were 2.5 times the operating costs ($80,250) in south/south central Alberta, Group II. It is recalled that Group I greenhouses had 41 percent more area than those in Group II and that they tended to operate year round. The average operating costs for the study sample amounted to $125,067. Average operating costs per square foot for Group I, Group II and the study sample were $5.37, $3.03 and $4.11, respectively.

Production Costs and Returns by Regions

Results presented in Tables 4 and 5 reveal that the major costs in greenhouse operations were for labour (hired, operator and family), followed by material inputs (cutting, seed, fertilizer, chemicals, containers and labels) and greenhouse fuel. The relative shares of total production costs were 35.6 percent, 22.4 percent and 7.5 percent, respectively. Average fuel costs per greenhouse operations in Group I was 8.5 percent of total operating costs compared to 6.2 percent for Group II greenhouses.

Business and property taxes for the study sample comprised almost 2 percent of total operating costs. These taxes amounted to 1.1 percent of operating costs in Group I, north/north central Alberta, and about 3 percent in Group II, south/south central Alberta.

The average production costs for the typical greenhouse surveyed amounted to $155,012 or $5.09 per square foot. Production costs for greenhouses in the north/north central

TABLE 4 AVERAGE GREENHOUSE OPERATING COSTS FOR THE GREENHOUSES SURVEYED, 1978

Cost Items	Group I	Group II	Study Sample
Number Surveyed	12	21	33
Average Area, Sq. Ft.	37422	26449	30439
Hired Labour	$ 74803.21	$15470.91	$ 38036.48
Growing Media	7179.17	1656.52	3664.76
Seed/Cuttings	21556.67	21609.38	21590.21
Fertilizer	1590.58	871.67	1133.09
Chemicals	1548.08	518.14	892.67
Greenhouse Fuel	17186.08	4987.95	9423.64
Telephone & Telegraph	2268.42	538.48	1167.55
Power and Water	4779.17	2984.24	3636.94
Greenhouse Insurance	976.00	1033.38	1012.52
Building, Machinery Repairs	5741.33	2354.19	3585.88
Property Tax	1781.67	2229.19	2066.45
Business Tax	361.33	125.00	210.94
Containers	12160.33	3447.90	6616.06
Labels and Tags	1651.25	333.43	812.64
Vehicle Leasing, Rental & Freight	2800.75	1529.00	1991.45
Automotive Fuel, Repair & Maintenance	2804.67	2133.67	2377.67
Registration, Insurance (Vehicle)	739.17	574.38	634.30
Accounting and Legal	1413.00	400.00	768.36
Office Supplies	1965.33	635.76	1119.24
Donation & Membership	177.17	180.10	179.03
Advertising	4184.33	1238.43	2309.67
Travel and Conventions	914.52	748.29	808.74
Soil Testing	143.17	62.48	91.82
Marketing Charges[1]	1753.75	1890.01	1840.46
Miscellaneous[2]	6952.15	2181.01	3915.97
Interest on Operating Capital	11685.52	4620.37	7189.51
Depreciation - Building, Machinery and Automotive	11655.95	5895.90	7990.47
AVERAGE OPERATING COSTS PER GREENHOUSE	$200772.77	$80249.78	$125066.52
AVERAGE OPERATING COSTS PER SQ. FT.	$ 5.37	$ 3.03	$ 4.11

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[1] Commission and other marketing related charges.

[2] Includes small tools, shop supplies, promotional costs other than advertising.

TABLE 5

COMPARISON OF COSTS AND RETURNS BETWEEN GROUP I, GROUP II, AND THE STUDY SAMPLE

	Group I	Group II	Study Sample
Number Surveyed	12	21	33
Average Area (SQ. Ft.)	37422	26449	30439
GROSS REVENUE	$292643	$117606	$181256
GROSS REVENUE/SQ. FT	$ 7.82	$ 4.45	$ 5.95
OPERATING COSTS			
Material Inputs	$ 45686.08	$ 28437.04	$ 34709.43
Hired Labour	74803.21	15470.91	38036.48
Greenhouse Fuel, Power, Water	21965.25	7972.19	13060.58
Telephone, Telegraph, Accounting, Legal	3681.42	938.48	1935.91
Insurances, Registration Fees	1715.17	1607.76	1646.82
Building, Machinery Repairs, Maintenance	8546.00	4487.86	5963.55
Taxes	2143.00	2354.19	227.39
Office Supplies	1965.33	635.76	1119.24
Freight, Leasing, Express	2800.75	1529.00	1991.45
Donations, Memberships, Advertising	4391.50	1418.53	2488.70
Travel and Conventions	914.52	748.29	808.74
Marketing Costs	1753.75	1890.01	1940.46
Miscellaneous[1]	7095.32	2243.49	4007.79
Depreciation	11655.95	5895.90	7990.47
Interest on Operating Capital	11685.52	4620.37	7189.51
TOTAL OPERATING COSTS	$200772.77	$ 80249.78	$125066.52
OTHER COSTS			
Land, Building, Equipment Interest	$ 17521.43	$ 10097.55	$ 12797.15
Operator's Labour	$ 17172.50	$ 17134.69	$ 17148.44
TOTAL OTHER COSTS	$ 34693.93	$ 27232.24	$ 29945.59
TOTAL PRODUCTION COSTS	$235466.70	$107482.02	$155012.11
TOTAL PRODUCTION COSTS/SQ. FT	$ 6.29	$ 4.06	$ 5.09
NET GREENHOUSE INCOME	$ 91870.23	$ 37356.22	$ 56189.48
RETURN OVER CASH COSTS[2]	$103526.18	$ 43252.12	$ 64179.95
RETURN OVER CASH COSTS/SQ. FT.	$ 2.77	$ 1.64	$ 2.11
RETURN TO MANAGEMENT/SQ. FT.	$ 1.53	$ 0.39	$ 0.86

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[1] Includes small tools, shop supplies, promotional costs other than advertising and soil testing.

[2] Total operating costs less depreciation.

Alberta, i.e. , Group I, were $235,467 compared to $107,482 for Group II greenhouses. Correspondingly, the average production costs per square foot were $6.29, $4.06, and $5.09 for Group I, Group II and the overall study sample, respectively.

The average gross revenue per greenhouse studied in 1978 was $181,256 or $5.95 per square foot. Average gross revenue for Group I participants was $292,643 against $117,606 estimated for Group II participants (Table 5). In other words, as with operating costs, the gross revenue for Group I participants was 2.5 times greater than Group II participants.

Average net greenhouse income and return over cash costs were positive for both groups of growers and the study sample. The average net greenhouse income ranged from $91,870 for Group I to $37,356 for Group II; the average for the study sample was $56,189. Returns over cash costs were lower in the south, Group II, ($1.64 per square foot) compared to the north, Group I ($2.77 per square foot). Average return over cash costs for the sample was $2.11 per square foot.

The average return to management was $1.53, $0.39, and $0.86 per square foot for the participants in Group I, Group II and the study sample, respectively. Further details regarding costs and returns for the three categories are presented in Table 5.

Production Costs and Returns by Crops Produced

The study sample was divided into two groups according to the type of enterprise with no consideration to the location of greenhouses. Through classification by crops grown it was established that twenty greenhouses (61%) were growing flowers, bedding plants, potted plants and some vegetables, and the remaining thirteen (39%) were producing vegetables (mostly cucumbers) and some tomatoes.

The average gross revenue for the greenhouse operators producing flowers, bedding plants, potted plants and selected vegetables was $274,928 per greenhouse in 1978 (Table 6). Gross revenue per square foot of the greenhouse area was $7.31 for these greenhouses. For the greenhouses producing mainly vegetables, average gross revenue per greenhouse was $37,144 or $1.91 per square foot. Average production costs for the flowers and vegetable group were $230,941 per greenhouse or $6.14 per square foot. In contrast, average production costs were $38,198 per greenhouse for the vegetable producing group; the unit production costs were $1.97 per square foot.

The average net greenhouse income was considerably higher for the flowers and vegetable group at $80,846 against $18,255 for the greenhouse vegetable producers. Average return to management was $43,987 or $1.17 per square foot, for those greenhouses producing a combination of flowers and vegetable crops. However, the average vegetable producer, showed negative returns to management of $1,054 per greenhouse or 5.4¢ per square foot.

The average return over cash costs was $2.11 per square foot for the study sample, $2.43 per square foot for flowers and vegetable producers, and $1.15 per square foot for vegetable growers.

The major costs in the greenhouse operation were labour (hired plus operator and family), and material input costs, followed by greenhouse fuel. Breakdown of all operating and investment costs for greenhouses by the type of crops produced are presented in Table 6.

TABLE 6 COMPARISON OF COSTS AND RETURNS BY GREENHOUSE CROPS

	Study Sample	Flowers & Vegetables	Vegetables
Number Surveyed	33	20	13
Average Area Sq. Ft.	30439	37601	19421
Gross Revenue/Greenhouse	$181256	274928	37144
Gross Revenue/Sq. Ft.	$ 5.95	7.31	1.91
OPERATING COSTS			
Material Inputs[1]	$ 34709.43	56040.10	1893.01
Depreciation	7990.47	10487.75	4148.48
Hired Labour	38036.48	62052.74	1088.37
Interest on Operating Capital	7189.51	11275.02	904.12
Greenhouse Fuel	9423.64	14541.80	1549.54
Insurance and Registration (Vehicle)	634.30	930.30	178.92
Equipment Repairs, Maintenance & Fuel	2377.67	3252.40	1031.92
Building Repairs and Maintenance	3585.88	5199.05	1044.08
Greenhouse Insurance	1012.52	1228.30	680.54
Telephone, Telegraph	1167.55	1846.65	122.77
Power, Water	3636.94	5656.65	528.15
Accounting and Legal	768.36	118.02	131.92
Property Tax	2066.45	2444.05	1485.54
Business Tax	210.94	348.05	-
Office Supplies	1119.24	1776.80	107.62
Donations & Membership	179.03	218.40	118.46
Advertising	2309.67	3810.95	-
Freight, Leasing, Express	1991.45	3278.60	11.23
Travel to Conventions etc.	808.74	1323.91	16.15
Marketing Costs	1840.46	1128.65	2935.56
Miscellaneous[2]	4007.79	6058.58	852.69
TOTAL OPERATING COSTS PER GREENHOUSE	$125066.52	194081.80	18889.07
TOTAL OPERATING COSTS PER SQUARE FOOT	$ 4.11	5.16	0.97
OTHER COSTS			
Land Interest	$ 309.15	402.05	166.23
Building Interest	9228.78	11436.17	5832.80
Equipment Interest	2165.68	3084.48	752.14
Automotive Interest	1093.54	1513.20	447.92
Operator's Labour	17148.44	20423.75	12109.50
TOTAL OTHER COSTS	$ 29945.59	36859.65	19308.59
TOTAL PRODUCTION COSTS	$155012.11	230941.45	38197.66
TOTAL PRODUCTION COSTS PER SQ. FT.	$ 5.09	6.14	1.97
Net Greenhouse Income[3]	$ 56189.48	80846.20	18254.93
Return to Management	$ 26243.89	43986.55	-1053.66
Return Over Cash Costs[4]	$ 64179.95	91333.95	22403.41
Return Over Cash Costs/Sq. Ft.	$ 2.11	2.43	1.15

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[1] Includes growing media, seed, fertilizer, chemicals, containers, labels and tags.

[2] Includes small tools, shop supplies, promotional costs other than advertising and soil testing.

[3] Net Greenhouse Income is the money allocated for operator's labour, management and financing.

[4] Total operating costs less depreciation.

Production Costs and Returns by Size of Operation

The study sample was further divided into three groups according to the size of operation. Sixteen (49%) greenhouses were placed in a group for which greenhouse area was 20,000 square feet or less; eleven (33%) in over 20,000 to 45,000 square feet range; and the remaining six (18%) with more than 45,000 square feet. The average greenhouse area for the smallest size class of greenhouses was 11,752 square feet; the average for the intermediate size of greenhouses was 30,758 square feet, with an average of 79,685 square feet for the largest greenhouses.

The average production costs per greenhouse were $44,830, $79,942, $563,868, respectively. However, average production costs per square foot, were lowest for the intermediate size greenhouses at $2.60, compared to $3.82 for the small greenhouses and $7.08 for the largest greenhouses. The average gross revenue for the smallest greenhouses was $43,869 or $3.73 per square foot of the greenhouse area. For greenhouses in over 20,000 to 45,000 square foot class, average gross revenue was $75,756 or $2.46 per square foot. For the third category of greenhouses i.e., over 45,000 square feet, the average gross revenue was $741,055 or $9.30 per square foot (Table 7).

Greenhouses with production area in excess of 45,000 square feet showed the highest returns over cash costs, $3.23 per square foot. Returns over cash costs were $1.06 and $1.87 per square foot for the small and intermediate size greenhouses, respectively.

The average return to management for the study sample was $26,244 per greenhouse, or 86¢ per square foot. Only the largest size class i.e., more than 45,000 square feet group, showed a positive return to management of $177,186 or

TABLE 7 COMPARISON OF COSTS AND RETURNS BY SIZE OF OPERATION

	Study Sample	20,000 Sq. Ft. Or Less	Over 20,000 To 45,000 Sq. Ft.	Over 45,000 Sq. Ft.
Number Surveyed	33	16	11	6
Average Area Sq. Ft.	30439	11752	30758	79685
Gross Revenue/Greenhouse	$181256	43869	75746	741055
Gross Revenue/Sq. Ft.	$ 5.95	3.73	2.46	9.30
OPERATING COSTS				
Material Inputs[1]	$ 34709.43	6779.48	10194.36	154133.50
Depreciation	7990.47	3372.81	6684.84	22697.85
Hired Labour	38036.48	3451.12	9794.36	182041.31
Interest on Operating Capital	7189.51	1337.11	2670.02	31081.65
Greenhouse Fuel	9423.64	2725.69	4727.55	35894.33
Insurance and Registration (Vehicle)	634.30	179.81	338.09	2389.33
Equipment Repairs, Maintenance & Fuel	2377.67	1111.94	1848.36	6723.33
Building Repairs and Maintenance	3585.88	492.56	2537.09	13757.50
Greenhouse Insurance	1012.52	503.56	1112.09	2187.18
Telephone, Telegraph	1167.55	208.31	553.27	4851.67
Power, Water	3636.94	1214.06	1423.00	14156.83
Accounting and Legal	768.36	187.81	415.64	2963.17
Property Tax	2066.45	811.87	2274.64	4763.67
Business Tax	210.94	66.00	107.27	787.50
Office Supplies	1119.24	325.69	956.27	3534.17
Donations & Membership	179.03	96.44	192.27	375.00
Advertising	2309.67	188.81	145.27	11933.33
Freight, Leasing, Express	1991.45	124.50	1502.18	7867.00
Travel to Conventions etc.	808.74	68.71	155.09	3980.50
Marketing Costs	1840.46	1345.02	1651.82	3507.50
Miscellaneous[2]	4007.79	566.62	547.97	19527.17
TOTAL OPERATING COSTS PER GREENHOUSE	$125066.52	25257.92	49831.45	506454.64
TOTAL OPERATING COSTS PER SQUARE FOOT	$ 4.11	2.15	1.68	6.36
OTHER COSTS				
Land Interest	$ 309.15	158.50	313.18	703.50
Building Interest	$ 9228.78	3800.68	9031.08	24066.15
Equipment Interest	$ 2165.68	755.80	1310.04	7494.01
Automotive Interest	$ 1093.54	500.16	980.14	2883.83
Operator's Labour	$ 17148.44	14316.47	18475.90	22266.67
TOTAL OTHER COSTS	$ 29945.59	19531.61	30110.34	57414.16
TOTAL PRODUCTION COSTS	$155012.11	44829.53	79941.79	563868.80
TOTAL PRODUCTION COSTS PER SQ. FT.	$ 5.09	3.82	2.60	7.08
Net Greenhouse Income[3]	$ 56189.48	18611.08	25914.55	234600.36
Return to Management	$ 26243.89	-960.53	-4195.79	177186.20
Return Over Cash Costs[4]	$ 64179.95	21983.39	32599.39	257298.21
Return Over Cash Costs/Sq. Ft.	$ 2.11	1.87	1.06	3.23

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[1] Includes growing media, seed, fertilizer, chemicals, containers, lables and tags.

[2] Includes small tools, shop supplies, promotional costs other than advertising and soil testing.

[3] Net Greenhouse Income is the money allocated for operator's labour, management, and financing.

[4] Total operating costs less depreciation.

$2.22 per square foot. Return to management for the small and intermediate size classes were negative, $961 (8¢ per square foot) and $4196 (14¢ per square foot), respectively. Details on average gross revenue, operating costs, other costs, and return to management for the three size classes of greenhouse operations are given in Table 7.

Comparison of Costs and Returns Between the Study Sample and Your Greenhouse

The information in Table 8 will be of particular significance to the study participants as it provides an opportunity for each greenhouse operator to compare his results with those of the study sample. In Table 8, only the average costs and returns information of the study sample is provided. The individual greenhouse operator column has been left open for the personal use of study participants. Each participant received a personalized report on his 1978 greenhouse operation; the results in this report were also reviewed with each participant. Any comments, concerns or suggestions made by the greenhouse operators were incorporated into this final report.

TABLE 8 COMPARISON OF COSTS AND RETURNS BETWEEN THE STUDY SAMPLE AND YOUR GREENHOUSE

	Study Sample	Your Greenhouse
Number Surveyed	33	-
Average Area Sq. Ft.	30439	-
Gross Revenue/Greenhouse	$181256	-
Gross Revenue/Sq. Ft.	$ 5.95	-
OPERATING COSTS		
Material Inputs[1]	$ 34709.43	-
Depreciation	7990.47	-
Hired Labour	38036.48	-
Interest on Operating Capital	7189.51	-
Greenhouse Fuel	9423.64	-
Insurance and Registration (Vehicle)	634.30	-
Equipment Repairs, Maintenance & Fuel	2377.67	-
Building and Maintenance	3585.88	-
Greenhouse Insurance	1012.52	-
Telephone, Telegraph	1167.55	-
Power, Water	3636.94	-
Accounting and Legal	768.36	-
Property Tax	2066.45	-
Business Tax	210.94	-
Office Supplies	1119.24	-
Donations & Membership	179.03	-
Advertising	2309.67	-
Freight, Leasing, Express	1991.45	-
Travel to Conventions etc.	808.74	-
Marketing Costs	1840.46	-
Miscellaneous[2]	4007.79	-
TOTAL OPERATING COSTS PER GREENHOUSE	$125066.52	-
TOTAL OPERATING COSTS PER SQUARE FOOT	$ 4.11	-
OTHER COSTS		
Land Interest	$ 309.15	-
Building Interest	9228.78	-
Equipment Interest	2165.68	-
Automotive Interest	1093.54	-
Operator's Labour	17148.44	-
TOTAL OTHER COSTS	$ 29945.59	-
TOTAL PRODUCTION COSTS	$155012.11	-
TOTAL PRODUCTION COSTS PER SQ. FT.	$ 5.09	-
Net Greenhouse Income[3]	$ 56189.48	-
Return to Management	$ 26243.89	-
Return Over Cash Costs[4]	$ 64179.95	-
Return Over Cash Costs/Sq. Ft.	$ 2.11	-

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[1] Includes growing media, seed, fertilizer, chemicals, labels and tags.

[2] Includes small tools, shop supplies, promotional costs other than advertising and soil testing.

[3] Net greenhouse income is the money allocated for operator's labour, management, and financing.

[4] Total operating costs less depreciation.

SECTION IV

PRODUCTION PROBLEMS IN THE ALBERTA GREENHOUSE INDUSTRY

Growth in the Alberta greenhouse industry has been relatively slow over the last 10-15 years. Greenhouse production has not kept pace with the increasing demand for greenhouse produce. In turn, increased demand for flowers, flower cuttings, potted plants and other greenhouse crops has been met by increased imports from British Columbia, Ontario, the U.S.A. and other countries.

The greenhouse industry in Alberta has shown considerable fluctuation in terms of greenhouse area. Crop production and total sales of greenhouse produce in Alberta increased from $6.2 million in 1976 to about $10 million in 1978. Overall greenhouse production area has shown a slight decrease despite the fact that number of firms reporting on their operations increased from 63 in 1976 to 71 in 1978.

Greenhouse operators surveyed for this study pointed out that several factors are restricting the growth of Alberta's greenhouse industry. Problems identified by the study participants are summarized as follows:

i) Greenhouse operations are labour intensive and, in Alberta, skilled labour for greenhouse operations is very scarce. Moreover, higher wage demands make it difficult to maintain steady employment for year-round operations. During the peak months of greenhouse operations, finding seasonal labour is a serious problem.

ii) Presently, greenhouse operators cannot afford to borrow funds from commercial funding agencies, because of the very high interest rates and lack of confidence of these agencies in the greenhouse industry. Too much time and effort are involved in obtaining funds from private lenders who discourage further investment in the greenhouse industry.

It was suggested by most of the study participants that insufficient financial assistance from the government lending institutions has been one of the factors restricting growth of the greenhouse industry in Alberta.

iii) Importation of fresh produce from the U.S.A., Mexico and other provinces has provided severe competition for the local produce. It was pointed out that consumer education has not been significant enough to help expand the local production of greenhouse crops. Greenhouse operators would like to see more emphasis placed on consumer education encouraging greater consumption of local fresh produce. Consumption of more local produce would, in turn, help to increase the production of greenhouse crops.

iv) Increase in heating costs is becoming a major concern of the greenhouse operators located in and around urban areas. High heating costs appear to be one of the key factors limiting expansion of the greenhouse industry as a whole and production during the winter months.

v) Increasing transportation costs and problems in hauling perishables from production areas to consumption centers are of great concern to greenhouse operators (especially flower growers) in Alberta.

Lack of dependable transportation service is viewed as a serious obstacle to the expansion of the greenhouse industry in Alberta.

SECTION V

TRANSPORTATION PROBLEMS IN THE ALBERTA GREENHOUSE INDUSTRY

The specific areas of concern as expressed by the members of "Flowers Canada" in Alberta and greenhouse study participants regarding air, bus, truck and rail transportation of perishables are as follows:[1/]

Air Service

Transportation of perishables by air is not very common in Canada. However, some high valued produce such as fresh flowers (cuttings and flower stems) are being brought in by aeroplanes from points in the U.S. (Arizona, California, Oregon and Florida) and from some European countries. Data on volume of air shipments of these produce received in Canada are most lacking. However, it is recognized that the use of the air service for shipping perishable produce is on the rise in both the U.S. and Canada. With air freight, shipment to the consumer can be made quickly to fulfill contracts, to provide better quality products, and to reduce warehousing costs.

Air shipment definitely gives the best service and customer satisfaction where speed and time are the critical criteria. Cost of air shipments is a major disadvantage of this service when compared to other transportation modes. However, since deterioration of the product is best counteracted by fast transportation, air service become progressively more advantageous as distance increases.

[1/] Information was obtained through personal interviews and the briefs presented by "Flowers Canada" in Alberta, to the Greyhound Bus Services, Motor Transport Board and the Railways.

There is not enough information regarding the air shipment of perishables within and to Canada. The only data which may be related to this service were obtained from the greenhouse operators and florists in Alberta who bring in fresh flowers and flower cuttings from Ontario, the U.S., and occasionally from South America and some European countries. Wholesale florists and greenhouse operators expressed the following concerns and reservations about the quality of air service available to them:

i) Air service is very expensive especially for perishables. Airline general commodity rates with cubed dimensional charge on floral shipments of $10 per shipment or $2 per $100 of value, whichever is the highest, makes this service very expensive.

ii) It takes too much time to handle air freight at terminals. Handling delays usually occur at the origin and/or destination terminals thereby increasing the time perishables spend in the transportation system. This increased time in transit leads to a deterioration in the quality of the flowers and cuttings. Moreover, the express services of the air carriers in Edmonton and Calgary do not deliver the produce to the greenhouse operators or flower shops in smaller towns.

iii) Storage facilities both at the origin and destination terminals are inadequate.

iv) One of the two Canadian national airlines does not allow shipment of perishables, especially cut flowers or mum cuttings, during the winter months, which make it difficult for the Alberta florist businesses to maintain continuous supply.

v) Lack of coordination between the air service and the express service aggravates the problems and causes delays in delivery of the produce.

vi) Smaller communities and towns in Alberta lack adequate air service.

vii) Airline rates of the U.S. and Canadian carriers are not uniform.

In addition to the problems mentioned above, there are some general concerns about the air service which not only affect the greenhouse operators, but also other shippers and receivers of perishables. The general concerns include the lack of uniform weight rate regulations between the U.S. and Canada, uneven traffic volume for back haul, and aircraft capacity.

Bus Service

Use of bus service is not very common when it comes to shipping or receiving perishables. Wholesalers, florists and greenhouse operators who produce flowers use the bus service for sending very small shipments of cut flowers (arrangements) to nearby communities or across the country. It is uneconomical to ship small loads by rail or truck. During discussions with the greenhouse study participants, especially the ones who use the bus service, it was revealed that bus service is not quite dependable for shipping fresh flowers. The problems with the bus service which were pointed out by the florists and greenhouse operators include the following:

i) There are frequent delays in forwarding shipments within a reasonable period of time. These delays occur most often during, but not restricted to, periods of high traffic volume. Most delays involve a number of days rather than hours. Also, when such delays occur, it is usually difficult to trace the shipment.

ii) Claims for damages are not handled expeditiously. Bus service agents allegedly discourage the filing of claims, and intimate that claims will probably not be paid. Some claim settlements have taken up to nine months to settle.

iii) The limitation of liability to $50 is unrealistic, as most floral shipments have a much higher value. Although there is provision for declaring a value higher than $50, the premiums are quite high and the shipment costs have to be prepaid.

iv) A surcharge of 65 cents is charged on "Floral" shipments, although there is no obvious justification for this surcharge.

v) A "Shipper Risk" clause is applied when the temperature falls below zero which means there is no guarantee for the safety of the produce or shipments sent during the winter months, and in many instances shipments have been damaged enroute.

vi) There are no facilities for carrying C.O.D. shipments.

Truck Service

i) Motor carriers impose arbitrary embargoes on carriage of perishable products particularly during the months of high demand and high volume of movement (e.g. December - February). Shipments during these months are only accepted "At Owner's Risk" or "At Shipper's Risk".

ii) Some carriers are not willing to undertake shipments on smaller branchlines which are less profitable.

iii) Independent truck operators in the province generally refuse to carry products such as flowers and plants. They claim that they do not have the equipment or terminal facilities to handle these products, although their franchise calls for them to carry a full range of general merchandise.

iv) Alberta members of Flowers Canada have offered to supply material and to instruct personnel of motor truck carriers on better methods of handling perishable products. Despite repeated offers, the carriers have failed to take advantage of this service.

v) Currently, some carriers are charging three to five times the first class tariff because of allegedly high claim settlements. So far there are no figures to establish or confirm how much has been paid in claims.

vi) Lack of appropriate storage facilities at truck terminals result in damage to the produce and a general lack of customer confidence in truck shipments.

vii) Most of the truckers discourage C.O.D. shipments which add to the financial strains of the greenhouse operators and the wholesaler.

Railway Service

During the last 12 to 15 years, the florists across Canada and specifically in Alberta, have seen a marked erosion of rail services; the railways have been advising florists that they have no service or facilities to transport floral products. The florists reported that while rail service was being eroded, they were assured on many occasions by railway representatives that their highway services would provide the floral industry with even better service which in fact has not been the case.

Presently, considerable confusion exists concerning the tariffs being used by railway companies as they apply to highway transportation facilities. The new tariff regulations have set out stringent packaging requirements, a rate structure, and a dimensional weight of 10 pound per cubic foot which are serious handicaps for the floral industry. Some tariffs shared by railway and motor carriers specify a dimensional weight of 15 pounds per cubic foot which further aggravates the problem of packaging. Application of this higher dimensional weight to a sizeable percentage of floral products has increased shipping costs considerably.

Railways express-service made it difficult for other carriers to provide services to smaller communities. Now, with the rail service being abandoned, these communities do not have any truck service.

Finally, the claim settlement procedure with railway management is said to be very time consuming and tedious.

SECTION VI

SUMMARY

Summary of Costs and Returns

This section provides summaries of the costs and returns information for the study sample by region, by the type of crops grown in the greenhouses and by the size of the greenhouse operation. The study sample consisted of 33 greenhouse operators who provided detailed financial information on their 1978 operation.

When the study sample was divided by region, there were 12 greenhouses (36%) in north and north central regions, (Group I), and 21 greenhouses (64%) in south and south central regions, (Group II). Distribution based on the types of crops produced showed 20 greenhouses (61%) producing mainly flowers, bedding plants, potted plants and selected vegetables, while 13 greenhouses (39%) were mainly growing vegetables. By the size of operation, there were 16 greenhouses (49%) each with an area of 20,000 square feet or less, 11 greenhouses (33%) were in the range of over 20,000 to 45,000 square feet, and the remaining 6 greenhouses (18%) were in the more than 45,000 square feet category.

The average production costs and returns for the year 1978 are summarized by region, crops produced, and the size of the greenhouse operation in Table 9.

The major production costs were labour, material inputs and greenhouse fuel. The relative shares of these costs of total production costs were 35.6 percent, 22.4 percent and 7.5 percent, respectively.

Business and property taxes averaged almost 2 percent of greenhouse operating costs.

Total production costs of a typical greenhouse in Alberta was $155,012 or $5.09/sq. ft. with estimated gross revenue of $181,256 ($5.95/sq. ft.). Average costs and returns were much higher for the greenhouses in north/north central Alberta, Group I, when compared to the greenhouses in south/ south central Alberta, Group II. Total production costs averaged $6.29/sq. ft. for Group I versus $4.06/sq. ft. for Group II. However, Group I greenhouses showed higher returns over cash costs ($2.77/sq. ft.) than Group II greenhouses ($1.64/sq. ft.). Average returns over cash costs for the study sample was $2.11/sq. ft.. Both groups had positive returns to management with northern operations being four times as profitable as their southern counterparts. Returns to management were $1.53/sq. ft., 39¢/sq. ft. and 86¢/sq. ft. for Groups I, II and the study sample, respectively.

The greenhouses producing a combination of crops showed substantially higher costs and net returns compared to greenhouses which only produced vegetables. Returns over cash costs of flowers and vegetable producers ($2.43/sq. ft.) were more than double those of vegetable producers ($1.15/sq. ft.). The greenhouses producing flowers and vegetables recorded profits of $1.17/sq. ft., whereas the vegetable producing greenhouses showed negative returns to management of 5.4¢/sq. ft..

A comparison of average costs and returns indicated total production costs and gross returns were higher for larger operations. Total production costs per square foot ranged from $2.60/sq. ft. for the intermediate size greenhouses to $7.08/sq. ft. for large greenhouses. In contrast, gross returns averaged $9.30/sq. ft. for the large greenhouses and only $2.46/sq. ft. for the intermediate size class. The highest returns over cash costs ($3.23/sq. ft.) were found among the large greenhouses, i.e., with an area in excess of 45,000 square feet. The small greenhouses, 20,000 sq. ft. or less, showed better returns than the intermediate size class, over 20,000 to 45,000 sq. ft.. These small size greenhouses reported higher returns over cash costs ($1.87/sq. ft.) compared to intermediate size greenhouses, ($1.06/sq. ft.). Returns over cash costs for the study sample were $64,180 or $2.11 per sq. ft..

Only the large greenhouses showed a profit or positive return to management; estimated profit was $177,186 or $2.22/sq. ft.. The estimated profit or returns to management for the other two classes were negative and varied from 8¢ to 14¢ per sq. ft. or $960 to $4,196 per greenhouse. The returns to management for the study sample as a whole were positive at $26,244 or 86¢ per sq. ft..

Summary of Findings

Findings of the study may be summarized as follows:

i) Considerable variation was found in the greenhouse structures across the province. In the north/north central regions (3, 4, 5 and 6), the greenhouse structures consisted of fiberglass (67%), glass (19%), and plastic (14%). In the south/south central regions (1 and 2), the greenhouse structures were mostly of glass (86%), with the balance being fiberglass (14%) and almost no plastic.

ii) The results revealed that average costs and returns were much higher for the greenhouses in north/north central Alberta against the greenhouses in south/south central Alberta.

iii) Greenhouses producing combination of crops, i.e., flowers, bedding plants, potted plants and selected vegetables showed relatively higher costs and net returns when compared with the greenhouses producing only vegetables.

iv) Greenhouses with larger production area and retailing facilities showed much higher net returns when compared to smaller and intermediate class greenhouses which rely more on wholesaling their produce. Returns for small greenhouses (less than 20,000 sq. ft.) were more favourable than intermediate size greenhouses.

v) Forty-three percent (14) of the greenhouse operators producing flowers and vegetables sold 60 to 70 percent of their produce to wholesale and retail stores. The balance was sold at the greenhouse gate. Eighteen percent (6) of greenhouse operators owned retail shops and marketed 70 to 80 percent of their produce through these facilities.

Greenhouse vegetable growers (13) in southern Alberta sold most of their produce through the Red-Hat Co-op at Redcliff.

vi) Availability of reliable labour was pointed out to be a serious problem in the greenhouse industry.

vii) Transportation of flowers and flower cuttings was another area of concern which has not been favourable for the growth of this industry.

viii) There is a feeling among the greenhouse operators in Alberta that government (both federal and provincial) lending institutions provide insufficient financial assistance for greenhouse operations, and it could be one of the primary factors limiting the growth of the industry. The requirements for loans from commercial institutions tend to discourage borrowing for greenhouse operations.

ix) Greenhouses in Alberta have difficulty in competing with fresh produce imported from the U.S. and Mexico.

x) The cost of energy, a major concern to greenhouse operators, amounted to 7.5 percent of total operating costs.

xi) Operators of greenhouse facilities in urban municipalities considered the payment of property and business taxes to be a financial burden to their business. Some operators suggested that as greenhouses produce agricultural crops, greenhouse operations should be classified as farming for tax purposes.

Average business and property taxes for the study sample comprised nearly 2 percent of total operating costs. These taxes were about 3 percent of operating costs in the south/south central regions and 1.1 percent in the north/north central regions.

TABLE 9 SUMMARY OF GREENHOUSE PRODUCTION COSTS AND RETURNS, 1978

Items	By Regional Distribution			By Crops Produced		By Size of Operation		
	Group I	Group II	Study Sample	Flowers & Vegetables	Vegetables	20,000 Sq. Ft. Or Less	Over 20,000 TO 45,000 Sq. Ft.	Over 45,000 Sq. Ft.
Number Surveyed	12	21	33	20	13	16	11	6
Average Area (Sq. Ft.)	37422	26449	30439	37601	19421	11752	30758	79685
Gross Revenue ($)	292643.00	117606.00	181256.00	274928.00	37144.00	43869.00	75746.00	741055.00
Gross Revenue/Sq. Ft. ($)	7.82	4.45	5.95	7.31	1.91	3.73	2.46	9.30
OPERATING COSTS								
Hired Labour ($)	74803.21	15470.91	38036.48	62042.74	1088.37	3541.12	9794.36	182041.31
Material Inputs ($)	45686.08	28437.04	34709.43	56040.10	1893.01	6779.48	10194.36	154130.50
Greenhouse Fuel ($)	17186.08	4987.95	9423.64	14541.80	1549.54	2725.69	4727.55	35894.33
Other Operating Costs ($)	63097.40	31353.88	42896.97	61447.16	14358.15	12301.63	25115.18	134338.50
TOTAL OPERATING COSTS ($)	200772.77	80249.78	125066.55	194081.80	18889.07	25257.92	49831.45	506454.64
Operating Costs/Sq. Ft. ($)	5.37	3.03	4.11	5.16	0.97	2.15	1.68	6.36
OTHER COSTS								
Land, Building, and Equipment Interest ($)	17521.43	10097.55	12797.15	16435.90	7199.09	5215.14	11634.44	35147.49
Operator's Labour ($)	17172.50	17134.69	17148.44	20423.75	12109.50	14316.47	18475.90	22266.67
TOTAL OTHER COSTS ($)	34693.93	27232.24	29945.59	36859.65	19308.59	19531.61	30110.34	57414.16
TOTAL PRODUCTION COSTS ($)	235466.70	107482.02	155012.11	230941.45	38197.66	44829.53	79941.79	563868.80
TOTAL PRODUCTION COSTS/SQ. FT. ($)	6.29	4.06	5.09	6.14	1.97	3.82	2.60	7.08
RETURN OVER CASH COSTS/SQ. FT. ($)1/	2.77	1.64	2.11	2.43	1.15	1.87	1.06	3.23
RETURN TO MANAGEMENT/SQ. FT. ($)	1.53	0.39	0.86	1.17	(-0.06)	(-0.08)	(-0.14)	2.22

Group I is North and North Central Regions (3, 4, 5 and 6).

Group II is South and South Central Regions (1 and 2).

1/ Total operating costs less depreciation.